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most frequently elliptical form with the longest diameter often from east to west, and if they occur several together on one leaf, they form always longitudinal rows from east to west, the spots in the middle being the largest. He has made a series of experiments so as to test the different theories, which have been enumerated above. It has been thereby proved, that drops of water are unable to cause any kind of burning by their own heat. Further, as shown by Sachs, the vegetative cell of land-plants is able to stand a heat of  $51^{\circ}$  C. All the experiments, made by the author in that direction, gave negative results, so that Neumann's theory cannot be correct. Some experiments were made with water of a temperature above  $60^{\circ}$  C., but even this did not affect the leaves.

As regards the supposition, that drops of water might have the same effect as lenses, it is quite clear that drops which have fallen on leaves merely represent half-lenses, a fact to which already De Candolle has called attention. And it is shown by experiments, that only when the drops of water were out of contact with the leaves, do they become able to cause a kind of burning, for instance when hanging down from the inside of a glass cover.

The author has come to the conclusion that in most cases the burnt spots are due to the poor quality of the covering glass, by the air bubbles of which the sunlight becomes concentrated so as to produce a burning on the leaves.—THEO. HOLM.

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## BRIEFER ARTICLES.

**Cleistogamy in the genus *Polygonum*.**—On page 273, vol. xvi, BOTANICAL GAZETTE, it is noted that "Mr. Thomas Meehan has found cleistogamous flowers in abundance on *Polygonum acre* and suspects the same habit in other species." On page 314 of the same volume of the GAZETTE, Mr. T. H. Kearney, Jr., records his observation of cleistogamous flowers upon *Polygonum acre* at Knoxville, Tenn., accompanying his note with figures. Mr. Kearney farther states that he has "searched for cleistogamic flowers on other species of *Polygonum* without success."

I am led by the appearance of these notes to state that in my studies of the genus *Polygonum*, I have found cleistogamous flowers

on many species, thus verifying the thought of Mr. Meehan. From an examination of my preliminary notes upon the genus, verified by a reëxamination of the specimens, I report the finding of cleistogamous flowers upon the following species: *P. arifolium*, in which the achenes in my specimens were incompletely developed; *P. Bolanderi*, *P. Californicum*, *P. Careyi*, *P. Hartwrightii*, *P. Hydropiper*, the condition being extremely common in this species; *P. hydropiperoides*, in which in every case examined the achenes were perfected; *P. lapathifolium*, *P. maritimum*, *P. ramossissimum*, in which case, however, I am not thoroughly convinced as to the cleistogamous character of the flowers so referred; *P. sagittatum*, and *P. Persicaria*. I found that in almost every case in which I had late collections of the species mentioned above, cleistogamous flowers existed. That more species are not included in the list is, I am inclined to believe, due to the fact that the specimens of the other forms in my possession were collected in the earlier portion of their season. I believe that in all cases where collections are made after Sept. 15th, cleistogamous flowers may be reasonably expected.

The figures given by Mr. Kearney in the note referred to above present an exceptional condition. In the many forms which I have examined it only occurs once or twice. Ordinarily the cleistogamous flowers are completely concealed by the sheath, but if well developed their presence may be detected by the appearance of an apparent intumescence of the sheath on one side of the stem and slightly above the node. Occasionally when the sheath is short the tip of the flower may be seen projecting a little beyond its border. In the ordinary herbarium specimen, unless care is taken in the dissection, the flower will be taken for a fragment of the sheath, unless indeed the achene be well developed. I have as yet detected only a single flower at each node, but am not prepared to say that this is the rule.

In this connection I would like to ask botanists throughout the country to send me any notes they may have upon the genus, and to state that I would be glad to receive specimens for examination from such as are willing to spare them for a sufficient time for their proper study.—STANLEY COULTER, *Purdue University, La Fayette, Ind.*

**Cultivating the ascosporous form of yeast.**—The methods usually recommended for securing the ascosporous state of yeast, i. e. by cultivation upon slices of potato or other vegetables, or even upon plaster of Paris slabs, have always ended in failure in my laboratory, until a recent trial by the method suggested by Hansen.<sup>1</sup> This method con-

<sup>1</sup> Les ascospores chez le genre *Saccharomyces*. Comp. rend. trav. du lab. de Carlsberg, ii, p. 30; also see Zopf, *Die Pilze*, p. 414.